On the Mechanism and Causes of the Changes of Colour in the Chameleon. By M. P. Bert.

The observations and experiments which are developed in the memoir that I have the honour to lay before the Academy may be summed up in the following propositions :—

1. There exist, in the skin of the chameleon, contractile corpuscles of different colours, which are sometimes hidden in the depths of the dermis and sometimes spread out at the surface in innumerable ramifications, interlacing from one corpuscle to another (Milne-Edwards, Brucke, G. Pouchet).

We also find in it a superficial yellow pigment and a *cærulescent layer* (G. Pouchet), yellow by transmitted light, blue on an absorbent ground.

2. The section of a mixed nerve has the result of giving to the whole of the cutaneous region that it innervates a dark blackish tint; its excitation causes the same region to acquire first a green, then a yellow tint.

This is the case also with a fragment of skin separated from the body and then excited by electricity (Brucke).

3. The section and the excitation of the spinal marrow produce the same effects in the whole posterior region of the body.

When the section is effected in the cervical region, the head and the anterior part of the body are also blackened. The nerves which run to the coloured corpuscles of these regions originate between the third and the sixth dorsal vertebræ; they follow the great sympathetic nerve of the neck.

4. After the section of the medulla the energetic excitation of a mixed nerve induces, by reflex action, a slight lightening of the skin, especially on the corresponding side.

5. Semisection of the spinal marrow causes the blackening of the corresponding side.

6. After the ablation of the two cerebral hemispheres the animal no longer spontaneously changes colour, but it changes as before when it is excited. The same result follows the removal of the optic tubercles, the cerebellum, or the commissure.

But if the *medulla oblongata* be cut transversely beyond the fourth ventricle, the whole body becomes black, and no longer changes colour.

7. During sleep and anæsthesia, and after death, the whole body becomes yellowish white.

8. After the ablation of one cerebral hemisphere (an ablation the consequence of which is the loss of the opposite eye), the corresponding side changes colour much more rapidly than the opposite side; moreover, it remains always of a much darker tint. The ablation of the sound eye does not restore the equilibrium.

After the ablation of one eye the corresponding side remains much lighter than that upon which the animal can see; the ablation of both eyes restores the equilibrium.

9. Curare does not act upon the colorator nerves, the excitation of which induces the light tint when the motor nerves no longer produce muscular contraction; eserine (physostigmine), on the contrary, acts first upon the colorator nerves.

10. Light gives a dark tint to the portions of the skin that it strikes (C. Perrault, Vrolik, ... Brucke). This action, which is exceedingly distinct during sleep, during anæsthesia, and after death, is very manifest even during the waking state. It takes place through dark blue glass, but not through red and yellow glasses.

Conclusions.—From the whole of these facts the following conclusions may be drawn:—

a. The various colours and tints that chameleons assume are due to the change of position of the coloured corpuscles, which, according as they bury themselves under the dermis, or form an opaque ground beneath the cærulescent layer, or spread out in superficial ramifications, either leave the skin its yellow colour or give it green and black colours.

b. The movements of these corpuscles are governed by two kinds of nerves, some of which cause them to travel from the depths towards the surface, while the others produce the opposite effect. In the state of maximum excitation these corpuscles conceal themselves beneath the dermis; this is also the case in the state of complete repose (sleep, anæsthesia, death).

c. The nerves which cause the corpuscles to flow back beneath the dermis have the greatest analogies with the vaso-constrictor nerves.

Like these, in fact, they follow the mixed nerves of the limbs and the great sympathetic of the neck; like them they do not intercross in the spinal marrow; like them they have their origin for the head at the commencement of the dorsal region; like them they possess a very powerful reflex centre in the *medulla oblongata*, the entire spinal marrow being another much less energetic centre; like them they are not affected by curare and poisoned by eserine.

d. The nerves which bring the corpuscles towards the surface are comparable to the vaso-dilatator nerves; but although we are forced to assume their existence, it is difficult to say any thing very distinct as to their anatomical distribution and their relations to the nervous centres; it is very probable that they traverse nervous cells before passing to the colouring corpuscles.

e. Each cerebral hemisphere, by the intermediation of the reflex centres, governs the colorator nerves of both sides of the body; but it acts principally upon the nerves analogous to the vaso-constrictors of its own side, and on the nerves analogous to the vaso-dilatators of the opposite side.

In the regular condition of things each hemisphere comes into play (besides the excitations arising by general sensibility) under the influence of excitations coming through the eye of the opposite side.

f. The luminous rays belonging to the blue-violet region of the spectrum act directly upon the contractile matter of the corpuscles, causing them to move and to approach the surface of the skin.

I think I am justified in expressing the hope that these investigations will at last throw some light upon the history of the vaso-dilatator nerves, of which so little is known; they will also serve me as a starting point for studying the action that light must exercise upon the contractile substance under other circumstances, and particularly upon the sanguiferous capillaries of the human skin.—*Comptes Rendus*, November 22, 1875, p. 938.

On the Anatomy and Histology of Lucernaria. By M. A. de Korottneff.

During the summer of the present year I occupied myself with the anatomical and histological investigation of *Lucernaria octoradiata* in the laboratory of M. de Lacaze-Duthiers at Roscoff. The abundance of the animal and the perfect arrangement of the laboratory enabled me quickly to arrive at the results which I now communicate to the Academy.

The walls of the body consist of four layers:—1, the ectoderm, covered by a cuticle; 2, the gelatinous layer; 3, the elastic membrane; 4, the entoderm. At the bottom of the ectoderm, as well as in the entoderm, there are cells which become transformed into nematocysts or into glandular cells. The gelatinous layer and the *membrana propria* are traversed by elastic fibrils, which are prolongations of the entodermic cells. Two kinds of muscles occur in the *Lucernaria*, longitudinal and circular; the latter always form an exterior layer. The longitudinal muscles are represented by four trunks, which commence at the bottom of the foot. Halfway up the body of the animal each trunk divides into two rods; and each rod enters into a bundle of tentacles. A layer of longitudinal muscular fibres occurs in the walls of the peristome and of the buccal tube. The circular muscles exist (1) round the mouth, (2) along the margins of the body, and (3) in the tentacles. Each fibre is a simple cell, containing a very refractive fibril. The cells may unite by prolongations and develop a single fibril, which traverses a whole series of cells. The fibril grows at the expense of the cell itself; the protoplasm of the latter disappears almost entirely, and the nucleus is enclosed in the fibrous mass. The peristome on its outer surface is clothed with well-developed muscular cells; these cells at the same time separate a perforated cuticle; the presence of the latter proves that it is a layer of a muscular epithelium.

With regard to the nervous system of the Hydraria there are many suppositions, but nothing is positively known. Kleinenberg, without much reason, attributes a nervous character to the cells of